Economic Affairs, Vol. 62, No. 4, pp. 641-646, December 2017
DOI: 10.5958/0976-4666.2017.00077.8

Measuring the Knowledge Level of Farmers Regarding Improved Rice Cultivation Practices and Ranking of Associated Constraints

Anil Gupta*, Bupesh Kumar, Satish Sudan, B.B. Gupta, Ashok Gupta, Ajay Gupta, R.K. Salgotra, Pawan Kumar Sharma, Anil Bhat, Gurdev Chand, M.K. Pandey and A.K. Razdan

Sher-e-Kashmir University of Agricultural Sciences & Technology Jammu, Main Campus, Chatha, (J&K), India

*Corresponding author: anilgupta2018@gmail.com

ABSTRACT

The Production Oriented Surveys on paddy growing areas were conducted in the three plain districts of Jammu region namely; Jammu, Samba and Kathua during the years 2003, 2005, 2008, 2010, 2011 and 2012. The information was gathered regarding the knowledge of farmers about improved practices of paddy cultivation, as recommended in package and practices. It is revealed from the study that the Knowledge Index of paddy growers was less than 50%, and majority of the respondents fall under the medium level category in terms of knowledge about improved practices of paddy cultivation. It was also observed that the knowledge of improved practices did not vary much between different districts and statistically were at par with each other. Lack of critical inputs at the right time and insufficient skill in dealing with diseases and pest control were the main constraints in achieving higher productivity. A number of steps are required to be taken to provide opportunities to farmers for adopting improved practices in paddy cultivation, either through the provision of training programmes or by making effective administrative decisions at the right time.

Keywords: Production oriented surveys, knowledge index, garret ranking

Maize, rice and wheat crops are the three major cereals of Jammu & Kashmir grown over an area of about 307.00, 274.00 and 255.65 thousand hectares, respectively (Economic Survey J&K, 2013-14). Rice constitutes the most important food grain crop in the plains of Jammu region. The increasing trend in rice production over the years with the introduction of semi-dwarf, high-yielding rice varieties in early seventies and introduction of modern means of agriculture technology have shown positive results. Area under rice in and of J&K state has increased from 263.25 thousand hectares in 2007-08 to 274.00 thousand hectares in 2013-14 including an area of 116 thousand hectares in Jammu region and 158 thousand hectares in Kashmir region. The production of rice has also increased from 5574 thousand quintals in 2007-08 to 9044 thousand quintals in 2013-14. The yield has increased from 21.35 quintals/hectare in 2007-08 to 32.38 quintals/hectare in 2013-14 including an average productivity of 28.31 quintals/hectare for Jammu region and 36.46 quintals/hectare for Kashmir region (Economic Survey J&K, 2013-14). Still the State is not able to meet its basic requirements to feed its more than one crore mouths (J&K ENVIS Centre). To achieve self-sufficiency in rice production, there is a need to make the farmers knowledgeable about improved rice farming techniques. Evidence throughout the developing countries shows that farmers' knowledge about scientific methods and practices remain very low. So a study was conducted to understand the practices and shortcomings in the cultivation of rice in Jammu region of Jammu & Kashmir based on the Production Oriented Surveys. The soils are well

suited for rice cultivation in Jammu region and 90 per cent of the area under rice is irrigated. Jammu region alone contributes more than 74 per cent of total rice produced in the state.

This paper therefore attempts to highlight the different aspects of rice cultivation and farmers' practices in rice production in the *kandi* and plains districts of Jammu region of J&K. Survey was conducted in the rice growing plain areas of three districts of Jammu & Kashmir. Canals and bore wells were the main sources of irrigation. Electricity was the main source of power for agricultural operations. Adequate amount of fertilizers were applied by the farmers. Storage and drying facilities were either inadequate or not available. The main sources of seeds were private institutions or from last year's hybrids.

Methodology

Production Oriented Surveys (POS) on rice have been a regular feature all over India, conducted under the aegis of Directorate of Rice Research (DRR), Hyderabad. Under the AICRIP scheme, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu has also conducted several surveys in the plains of Jammu region for identifying the status and scenario of rice production and the constraints faced by the farmers associated with its cultivation. Extensive Production Oriented Surveys were conducted in the mentioned districts during 2003, 2005, 2008, 2010, 2011 and 2012 mainly at the time, when majority of the crop stood either at dough or maturity stage. The survey was accomplished with the active collaboration of the scientists of different disciplines of the university and officials of state department of agriculture.

Each practice was put in question form to obtain responses from the respondents. The correct response was given a score of 'one' and incorrect responses 'zero'. The total score for each respondent was computed by summing up the scores on all knowledge items. The maximum and minimum score obtainable for each respondent was 32 and zero, respectively. Based on the total scores obtained, the knowledge index was worked out as follows:

$$\text{Knowledge index} = \frac{\text{No of correct responses}}{\text{Total no. of knowledge items}} \times 100$$

Respondents were then, categorized into three groups of knowledge level based on mean and SD. Further, to find out the constraints in production, marketing and processing of paddy by the farmers, traders and processors, the Garret ranking technique was used (Garret and Woodworth, 1969; Kathiravan *et al*. 1999; Kumar and Kumar, 2008). The constraints were prioritized by using Garrett's ranking technique in the following manner:

$$\text{Percentage position} = \frac{100\left(R_{ij} - 0.5\right)}{N_j} \times 100$$

Where,

R_{ij} = Rank given for the i^{th} item by the j^{th}, respondent and

N_j = Number of items ranked by the j^{th}, respondent

The percentage position of each rank was converted into scores using Garret table. For each constraint, scores of individual respondents were added together and divided by total number of respondents for whom scores were added. Then, mean score for each constraint was ranked by arranging them in the descending order.

RESULTS AND DISCUSSION

Rice is generally grown in Jammu & Kashmir on the same field consecutively in the *kharif* season. Jammu district is the most developed district of Jammu region in terms of infrastructure and marketing facilities. Two major cropping sequences with respect to rice crop were identified in Jammu district i.e. (1) Rice-Vegetables-Wheat and (2) Rice-Toria-Wheat. Samba Districtis a newly created subtropical district carved out from the districts of Jammu and Kathua. Nearly 23% area is irrigated and rest is rainfed in Samba district. The cropping sequences identified for this district are (1) Rice-Vegetables-Wheat and (2) Rice-Toria-Wheat. Kathua district is the border district of Jammu & Kashmir state with that of the state of Punjab. The cropping sequences identified in the plains of Kathua district with respect to rice crop is Rice-Oilseeds-Wheat. The varieties grown in Jammu, Samba and Kathua are similar because of the similarity of socio-economic conditions. However, the trend shows minor differences in the type of varieties grown in these districts as shown in Table 1.

The detail of incidence of insect-pest and diseases

Table 1: Varieties of paddy associated with plains of Jammu region

Detail of Varieties grown	Name of District		
	Jammu	Samba	Kathua
Coarse varieties	Sharbati, Ratna, Ch. 1039, PR-116, IET-1410, Parmal and Jaya	Jaya	Jaya, PC-19, IET-1410, PR-116, K-343, Lalmundi, CH-1039, Begami, Parmal
Basmati varieties	Basmati-370, Pusa-1121, CSR 30	Ranbir Basmati, Pusa-1121	Basmati-370, Pusa 1121
Hybrid varieties	Hybrid-6444, PHB-71, Poonam	Hybrid-6444, PHB-71, Poonam	Hybrid PHB-71

Table 2: Incidence of insect-pest and diseases

District	Year	Diseases							Pests						Weeds	
		Bl	Blb	Bs	Shbl	Shr	Gd	Fs	Sb	Gh	LF	LH	Term	Rat	*Cyperus* spp.	*Echinochloa* spp.
Jammu	2003	L-M	L-M	L-M	L-M	—	—	—	—	—					M	M
	2005	—	L-M	L-M	L-M	L	L-M	M-S	L	—	L	L	L	L-M	M	M
	2008	—	—	L-M	L	L	L-M	—	L	L	—	—	—	—	L	L
	2010	—	—	L-M	L	—	—	L-H	L	L	L	—	—	—	L	L
	2011	L	L-M	M	L	L	L-M	L-M	L-M	L-M	—	—	—	—	L	M
	2012	—	L	L	—	—	L	L-M	L	L	L-M		L	L	M	M
Kathua	2003	L-M	L-M	L-M	L-M	—	L-M	L-M	L	M					L	L
	2008	—	—	L	L	L	L-M	—	L	L	—	—	—	—	L	L
	2012	—	L-M	L	—	—	L	L	L	L	L	—	—	—	L	L
Samba	2011	—	L-M	L-M	L	—	L	L-M	L-M	L-M	—	—	—	—	M	M
	2012	—	L	L-M	—	—	L-M	—	L	L	L-M	L-M	L-M	—	M	M

Bl-Blast, Blb-Bacterial leaf blight, Bs-Brown spot, Shbl-Sheath blight, Shr-,Sheath rot, Gd- Grain Discolouration, Fs-False smut, Sb-Stem borer, Gh-Grass hopper, LF-Leaf folder, LH-Leaf hopper, Term-Termite, L:Low, L-M; Low to Medium.

on rice over the last few years in three districts of Jammu region was presented in Table 2. Leaf folder damage was noticed at 20-25% intensity on IET-1410 in 2003. No major biotic stress or any insect-pest pressure was observed in any field except the false smut incidence that occurred in almost all the hybrids of rice and thereby causing yield loss even to an extent of 40 percent in Poonam hybrid in 2011. Hybrid PHB-71 was an exception that remained elusive from disease and pest pressure. In Marh and R.S. Pura blocks of Jammu region, unusual growth of the crop was noticed in 2012. There was a prominent feature seen wherein the plants had invariably attained the unusual height in affected fields. The primary tillers were at the ripening stage whereas the side/secondary tillers were either at late milking stage or some of them were found to be chaffy. After thorough investigation, multiple factors were found responsible in causing this type of syndrome. A drastic change in the climatic behaviour by way of the long dry spell followed by the delayed rains might have been the major causes.

Almost every variety except PHB-71 was infected with Brown spot (15-30%), Sheath blight (3-7%), BLB (5-15%), False smut (20-30% in Jaya) and stem borer (up to 20%) in 2011. Out of all, Pusa 1121 still remained the most sufferer followed by Basmati 370. Damage of crop through false smut even to the extent of 50% was observed conspicuously in areas adopting the hybrids. Sharbati growing near the hybrids was also found infected with false smut but with low strength.

The knowledge level of paddy growers regarding improved practices of paddy cultivation among these three districts of Jammu region has been presented in Table 3. It is evident from the table that the overall knowledge of respondents was the highest for practices like 'draining water from the field 10-15 days before harvesting' followed by 'Proper irrigation during tillering stage', 'Use of improved variety', 'Application of nitrogenous fertilizer in split doses', Application of nitrogenous fertilizer after pest control' and 'Application of $ZnSO_4$ or SSP atleast once in 3 years'. The lowest

Table 3: Item-wise knowledge of respondents regarding improved practices of paddy cultivation

Sl. No.	Particulars	Jammu (30)		Samba (30)		Kathua (30)		Overall (90)	
		No.	%	No.	%	No.	%	No.	%
1	Use of Improved variety	21	70.00	23	76.67	26	86.67	70	77.78
2	Seed rate	9	30.00	12	40.00	11	36.67	32	35.56
3	Seed treatment	7	23.33	6	20.00	8	26.67	21	23.33
4	Time of sowing/nursery raising	11	36.67	6	20.00	7	23.33	24	26.67
5	Area required to raise the nursery for one acre	6	20.00	5	16.67	6	20.00	17	18.89
6	FYM application in nursery	10	33.33	10	33.33	9	30.00	29	32.22
7	Zinc sulphate for nursery	16	53.33	12	40.00	14	46.67	42	46.67
8	Spacing between rows in nursery	10	33.33	8	26.67	12	40.00	30	33.33
9	Application of ammonium sulphate/urea in nursery when plants turn yellow	8	26.67	5	16.67	7	23.33	20	22.22
10	Age of seedlings at the time of transplanting	18	60.00	16	53.33	12	40.00	46	51.11
11	Plant to plant distance in the main field	11	36.67	10	33.33	10	33.33	31	34.44
12	No. of plants/sq.meter in bushening	9	30.00	7	23.33	8	26.67	24	26.67
13	Application of nitrogenous fertilizer in split doses	24	80.00	20	66.67	21	70.00	65	72.22
14	Application of potash fertilizers as a basal dose in a single application	11	36.67	10	33.33	8	26.67	29	32.22
15	Water level to be maintained in the field	8	26.67	7	23.33	10	33.33	25	27.78
16	Increasing urea efficiency by adding neem/coal tar	6	20.00	5	16.67	7	23.33	18	20.00
17	Benefit of potash application	5	16.67	4	13.33	6	20.00	15	16.67
18	Application of nitrogenous fertilizer after pest control	22	73.33	18	60.00	21	70.00	61	67.78
19	Ill effects of regular use of granular fertilizer	16	53.33	13	43.33	15	50.00	44	48.89
20	Application of $ZnSo_4$ or SSP atleast once in 3 years	20	66.67	16	53.33	18	60.00	54	60.00
21	Time of application of herbicides	18	60.00	17	56.67	18	60.00	53	58.89
22	Use of flat fan nozzle	11	36.67	10	33.33	9	30.00	30	33.33
23	Application of herbicide with urea or sand	13	43.33	12	40.00	14	46.67	39	43.33
24	Weeding interval	12	40.00	11	36.67	9	30.00	32	35.56
25	Controlling rat infestation	6	20.00	7	23.33	6	20.00	19	21.11
26	Knowledge about friendly insects	9	30.00	8	26.67	12	40.00	29	32.22
27	After flowering application of pesticides/ insecticides in the evening instead of morning	21	70.00	11	36.67	18	60.00	50	55.56
28	Application of pesticides/ insecticides in case of rain within three hours of spraying	8	26.67	6	20.00	8	26.67	22	24.44
28	Pest control	9	30.00	10	33.33	10	33.33	29	32.22
30	Disease control	9	30.00	7	23.33	8	26.67	24	26.67
31	Proper irrigation during tillering stage	25	83.33	25	83.33	26	86.67	76	84.44
32	Draining water from the field 10-15 days before harvesting	27	90.00	26	86.67	27	90.00	80	88.89

level of knowledge was obtained for practices like 'Benefit of potash application', 'Increasing urea efficiency by adding neem/coal tar', 'Area required to raise the nursery for one acre', 'Controlling rat infestation' and 'Seed treatment'. The range of knowledge however varies between different districts. The categorization of respondents on the basis of the overall knowledge level of improved practices of paddy cultivation for three districts has been presented in Table 4. It is evident from the table that majority of the respondents belong to medium level of knowledge in all the three

Table 4: Categorization of respondents on the basis of overall knowledge level of improved practices of paddy cultivation

Category	Jammu		Samba		Kathua		Overall	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Low	4	13.33	6	20.00	4	13.33	14	15.56
Medium	17	56.67	18	60.00	20	66.67	55	61.11
High	9	30.00	6	20.00	6	20.00	21	23.33
Total	30	100.00	30	100.00	30	100.00	90	100

districts of Jammu region which includes 56.67%, 60% and 66.67% for Jammu, Samba and Kathua districts, respectively. Jammu district however has the highest percentage of respondents in high category compared to Samba and Kathua districts, both of which have 20% under high level category. The samba district has the most number of low level category respondents (20%) followed by Kathua and Jammu districts. The Knowledge Index of improved practices of paddy cultivation of all the respondents for three districts has been presented in Table 5.

Table 5: Knowledge Index of improved practices of paddy cultivation

Sl. No.	District	Knowledge Index (%)
1	Jammu	44.90
2	Samba	41.98
3	Kathua	39.90
Overall		**42.26**

Table 6: Difference in knowledge level of different districts

Particulars	Jammu	Samba	Kathua	F-statistic	p-value
Median	14	14	13	0.66	0.52
S.D.	5.51	6.36	4.22		
Sample Variance	30.309	40.461	17.84		
Kurtosis	0.198	1.048	0.84		
Skewness	0.172	0.619	-0.06		
Range	25	26	19		
Minimum	3	2	3		
Maximum	28	28	22		

It evident from the Table 5 that the knowledge index of respondents for Jammu, Samba and Kathua districts were 44.90%, 41.98% and 39.90% respectively and the overall knowledge index of the improved practices of paddy cultivation was 42.26% which indicates that knowledge level had not reached even the half way mark. Balakrishnan & Vasanthakumar (2010) found that more than half the proportion (54.00 per cent) of respondents had medium level of knowledge followed by 31.00 per cent of the respondents who had high level of knowledge about SRI in Cuddalore district of Tamil Nadu.

Table 7: Constraints/Problems in paddy cultivation

Sl. No.	Constraints	Score	Ranks
1	Small & marginal holdings	43.67	IX
2	Use of old seed including seed mixture	68.82	IV
3	Problems in hybrids with respect to lack of knowledge	48.34	VII
4	Lodging	53.67	VI
5	Grain shuttering in field even with low wind velocity	38.00	XI
6	Shortage of Phosphoric and Potassic fertilizers	79.86	I
7	Rat menace	46.32	VIII
8	Higher disease and pest pressure	32.33	XII
9	Lack of awareness & orientation regarding disease and pest	68.90	III
10	Lack of awareness & orientation regarding use of chemicals	78.82	II
11	Lack of taste and aroma *vis-à-vis* local varieties	56.30	V
12	Non-availability of buyers	28.90	XIII
13	Low price at local private millers	42.75	X

The difference in knowledge level of different districts has been presented in Table 6, which shows the descriptive statistics of the right responses about the improved practices of paddy cultivation. The table indicates that the median was same i.e. 14 for Jammu and Samba districts and was higher compared to Kathua district. But the standard deviation for Kathua district is minimum which indicates that the respondents were similar in

their responses regarding the improved practices of paddy cultivation. However, statistically when we compare all the three districts, we could not find any significant difference between the three, as indicated by the F statistic and p-value which was greater than 0.05% level of significance.

The constraints faced by the paddy farmers are ranked for all the districts using Garret ranking technique as they were found to be similar in nature and extent. The ranks presented in Table 7 revealed that the 'shortage of phosphoric and potassic fertilizers' was the main constraint faced by the respondents in all the districts followed by other constraints like 'lack of awareness & orientation regarding use of chemicals', 'Lack of awareness & orientation regarding disease and pest', 'Use of old seed including seed mixture', 'lack of taste and aroma *vis-à-vis* local varieties' and 'lodging' etc.

CONCLUSION

There is no greater service than effectively disseminating knowledge from sources to recipients. Over time, efforts should be made by the agricultural scientist to reflect in the movement of countries higher up the index, thereby enhancing the overall knowledge pool of the farmers. However, it reveals from the study that the Knowledge Index of paddy growers was found to be less than 50%, and majority of the respondents fall under medium level category in terms of knowledge about improved practices of paddy cultivation. It was also observed that the variation is not praiseworthy in relation to the knowledge of improved practices among different districts and they are statistically at par with each other. Unavailability of critical inputs at the right time and insufficient acquaintance in controlling diseases and pestsare the main constraints in achieving higher productivity.

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